

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 01/04789

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C07K14/315

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, EMBL, GENSEQ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|------------------------|
| X | DATABASE EMBL 'Online! EMBL; 28 July 1999 (1999-07-28) PRITZLAFF C A ET AL.: "Streptococcus agalactiae cyl gene cluster, partial sequence" Database accession no. AF157015 XP002209268 Especially the sequence of the CylH and CylI proteins and the corresponding DNA & PRITZLAFF C A ET AL.: "Genetic basis for the beta-haemolytic/cytolytic activity of group B Streptococcus" MOL. MICROBIOL., vol. 39, 2001, pages 236-248, the whole document | 1-7, 9-21, 23-28 |
| P, X | | 1-7, 9-21, 23-28 |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 August 2002

Date of mailing of the international search report

27.08.02

Name and mailing address of the ISA

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PCT/GB 01/04789

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|--------------------------------|
| X | <p>DATABASE EMBL 'Online! EMBL; 25 May 1999 (1999-05-25) SPELLERBERG B ET AL.: "Streptococcus agalactiae cyl gene cluster, complete sequence" Database accession no. AF093787 XP002209269 Especially the sequence of the CylI protein and the corresponding DNA</p> | 1-7, 9-21, 23-28 |
| X | <p>& SPELLERBERG B ET AL.: "Identification of genetic determinants for the hemolytic activity of Streptococcus agalactiae by ISS1 transposition" J. BACTERIOL., vol. 181, no. 10, May 1999 (1999-05), pages 212-3219, the whole document</p> | 1-7, 9-21, 23-28 |
| X | <p>----- DATABASE EMBL 'Online! EMBL; 25 June 1997 (1997-06-25) DUEZ C M ET AL.: "Enterococcus hirae mraR, pbp3s, mraY, murD, murG, ftsQ and ftsA genes, mraW, yllC and ftsZ partial genes" Database accession no. Y13922 XP002209270 Sequence of the FtsQ gene and protein (007610)</p> | 3-6, 9-15, 17, 18, 24-28 |
| X | <p>----- DATABASE EMBL 'Online! EMBL; 27 February 1997 (1997-02-27) GUTTIEREZ J A ET AL.: "Streptococcus mutans ProX (opuABC) gene, partial cds; YlxM (ylxM) gene, complete cds; Ffh (ffh) gene, complete cds, alternatively spliced; SatC (satC) and SatD (satD) genes, complete cds; and SatE (satE) gene, partial cds" Database accession no. U88582 XP002209271 Especially the sequence of the satD protein and the corresponding DNA</p> | 9-21, 23-28 |
| X | <p>----- WO 99 16882 A (MEDIMMUNE INC) 8 April 1999 (1999-04-08) The whole document, especially SEQ ID No. 1 and 2</p> <p>----- -/-</p> | 3-6, 9-21, 23-28 |

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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|---|------------------------------|
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| X | <p>DATABASE EMBL 'Online! EMBL; 4 June 1997 (1997-06-04) PUCCI M J ET AL.: "Enterococcus faecalis strain A24836 cell wall/cell division gene cluster, y11B, y11C, y11D, pbpC, mraY, murD, murG, div1B, ftsA and ftsZ genes, complete cds" Database accession no. U94707 XP002209272 Sequence of the Cell division protein DIV1B</p> | 3-6, 9-21, 23-28 |
| X | <p>--- DATABASE EMBL 'Online! EMBL; 18 July 2000 (2000-07-18) SIMPSON A J G ET AL.: "Xylella fastidiosa 9a5c, section 136 of 229 of the complete genome" Database accession no. AE003990 XP002209273 Sequence of the Beta-ketoacyl- 'ACP! synthase II</p> | 3-6, 9-15,17, 18,24-28 |
| X | <p>--- DATABASE GENESEQ 'Online! 9 November 1998 (1998-11-09) BLACK M T ET AL.: "Streptococcus pneumoniae polypeptide coding region" Database accession no. AAV42990 XP002209274 Sequence</p> | 9-21, 23-28 |
| X | <p>& WO 98 23631 A (SMITHKLINE BEECHAM CORP.) 4 June 1998 (1998-06-04) the whole document</p> | 9-21, 23-28 |
| X | <p>--- DATABASE EMBL 'Online! EMBL; 6 May 1999 (1999-05-06) MEEHAN MC & OWEN P: "Sequence 1 from Patent WO9801561" Database accession no. A68631 XP002209275 Sequence</p> | 9-21, 23-28 |
| X | <p>& WO 98 01561 A (TRINITY COLLEGE DUBLIN) 15 January 1998 (1998-01-15) the whole document</p> | 9-21, 23-28 |
| A | <p>--- MICHEL J L ET AL: "Cloned alpha and beta C-protein antigens of group B Streptococci elicit protective immunity" INFECTION AND IMMUNITY, AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, US, vol. 59, no. 6, June 1991 (1991-06), pages 2023-2028, XP002107260 ISSN: 0019-9567</p> <p>--- -/-</p> | |

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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|--|------------------------|
| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | STALHAMMAR-CARLEMALM M ET AL: "THE R28 PROTEIN OF STREPTOCOCCUS PYOGENES IS RELATED TO SEVERAL GROUP B STREPTOCOCCAL SURFACE PROTEINS, CONFER PROTECTIVE IMMUNITY AND PROMOTES BINDING TO HUMAN EPITHELIAL CELLS" MOLECULAR MICROBIOLOGY, BLACKWELL SCIENTIFIC, OXFORD, GB, vol. 33, no. 1, July 1999 (1999-07), pages 208-219, XP000964694 ISSN: 0950-382X | |
| P,X | ----- DATABASE EMBL 'Online! EMBL; 29 May 2001 (2001-05-29) LE PAGE R W ET AL.: "Sequence 217 of Patent W00132882" Database accession no. AX134653 XP002209276 Sequence | 1-7, 9-21, 23-28 |
| P,X | & WO 01 32882 A (HANNIFFY SEAN BOSCO (GB); LE PAGE RICHARD WILLIAM FALLA (GB); ET AL.) 10 May 2001 (2001-05-10) the whole document | 1-7, 9-21, 23-28 |
| P,X | ----- DATABASE EMBL 'Online! EMBL; 16 April 2001 (2001-04-16) FERRETTI J J ET AL.: "Streptococcus pyogenes M1 GAS strain SF370, section 87 of 167 of the complete genome" Database accession no. AE006558 XP002209277 Sequence of the Hypothetical protein satD and the corresponding DNA sequence ----- | 1-7, 9-21, 23-28 |

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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: **22**
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(v) PCT - Presentation of information
2. ☒ Claims Nos.: **26 partially**
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
1-7, 9-21, 23-28 all partially
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

Invention 1: claims 1-21,23-25,27,28 all partially

The protein having the amino acid sequence of SEQ ID No. 2, the nucleic acid of SEQ ID No. 1 encoding it and antibodies, compositions, processes and methods related thereto.

Inventions 2-6541: claims 1-21,23-25,27, 28 all partially

The proteins having the amino acid sequences of SEQ ID No. 4,6,8,10...., 10966, the nucleic acids of SEQ ID No. 3,5,7,11,...,10965 encoding them and antibodies, compositions, processes and methods related thereto.

Invention 6542: claims 1-21,23-25,27, 28 all partially

A bacterial chromosomal DNA (SEQ ID No. 10967)

Invention 6543: claims 1-21,23-25,27, 28 all partially

Primers having the sequence of SEQ ID No. 10968-12024

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 26 partially

Present claim 26 relate to a compounds defined by reference to a desirable characteristic or property, namely that it binds to a protein of the invention.

The claims cover all compounds having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such compounds. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to the antibodies directed to said proteins.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/GB 01/04789

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|---|---------------------|----------------------------|---------------------|
| WO 9916882 | A | 08-04-1999 | AU 9507698 A | 23-04-1999 |
| | | | EP 1037997 A1 | 27-09-2000 |
| | | | WO 9916882 A1 | 08-04-1999 |
| | | | US 6406883 B1 | 18-06-2002 |
| WO 9823631 | A | 04-06-1998 | EP 1023311 A1 | 02-08-2000 |
| | | | JP 2001508650 T | 03-07-2001 |
| | | | WO 9823631 A1 | 04-06-1998 |
| | | | US 2002086385 A1 | 04-07-2002 |
| | | | US 6346392 B1 | 12-02-2002 |
| | | | US 6165989 A | 26-12-2000 |
| | | | US 6287803 B1 | 11-09-2001 |
| WO 9801561 | A | 15-01-1998 | IE 960488 A2 | 19-11-1997 |
| | | | AU 3187797 A | 02-02-1998 |
| | | | WO 9801561 A1 | 15-01-1998 |
| WO 0132882 | A | 10-05-2001 | EP 1214417 A2 | 19-06-2002 |
| | | | WO 0132882 A2 | 10-05-2001 |

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International Bureau



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PCT

(10) International Publication Number
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Research, 9712 Medical Center Drive, Rockville, MD 20850 (US).

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0105640.7 7 March 2001 (07.03.2001) GB

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(71) Applicants (*for all designated States except US*): **CH-IRON S.P.A.** [IT/IT]; Via Fiorentina, 1, I-53100 Siena (IT). **THE INSTITUTE FOR GENOMIC RESEARCH** [US/US]; 9712 Medical Center Drive, Rockville, MD 20850 (US).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

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Published:

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16 January 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: NUCLEIC ACIDS AND PROTEINS FROM STREPTOCOCCUS GROUPS A & B

(57) Abstract: The invention provides proteins from group B streptococcus (*Streptococcus agalactiae*) and group A streptococcus (*Streptococcus pyogenes*), including amino acid sequences and the corresponding nucleotide sequences. Data are given to show that the proteins are useful antigens for vaccines, immunogenic compositions, and/or diagnostics. The proteins are also targets for antibiotics.



WO 02/034771 A3